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FCC Mail Room

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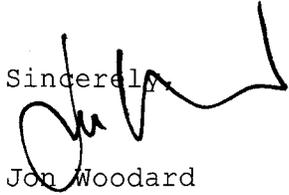
Federal Communications Commission  
Technology Transition Policy Task Force  
445 12<sup>th</sup> Street S.W.  
Washington, DC 20554

RE: Public Comment to GN Docket 13-5

Dear Sir or Madam:

Please find attached a public comment submitted with appendices and three copies for processing. Please contact me at the above address with any questions. Thank you.

Sincerely,



Jon Woodard

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**PUBLIC COMMENT TO:**  
**Federal Communications Commission Technology Transition Policy**  
**Task Force Seeks Comment On Potential Trials**  
**GN Docket No. 13-5**

Submitted by Jon A. Woodard  
3600 Bette Cato Ave.  
Seward, AK 99664

**I. Introduction**

On May 24, 2013, the Federal Communication Commission ("FCC") issued NG Docket No. 13-5; DA 13-1016; 78 FR 31542 entitled *Federal Communications Commission Technology Transition Policy Task Force Seeks Comment On Potential Trials*, (hereafter, "GN Docket 13-5") inviting public comment by July 8, 2013.

In Docket 13-5, the Technology Transition Policy Task Force ("TTPTF") sought comment on a variety of issues, including "[S]everal potential trials relating to the ongoing transitions from . . . next-generation 911 (NG911) and the transition from wireline to wireless service. . .and trials to facilitate better access for persons with disabilities. . . ." The undersigned provides comment on the foregoing issues, and specifically addresses test trials for the development of text-to-911 capabilities from smart phones, and other text capable devices that can send text messages directly to a 911 public safety answering point ("PSAP").

**II. Ongoing Development and Test Trials of Text-to-911 Systems and Devices**

It is well established that the FCC and numerous companies, associations, and organizations (including an agreement among wireless carriers, NENA, and APCO) are promoting the development and testing of NG911 systems and devices in the U.S., providing the capability of smart phones to send text messages directly to a PSAP, emphasizing the need for such applications providing access for persons with disabilities, and the discussion of other text-capable devices that can send text/data messages to a PSAP [See, e.g. FCC 10-200, *Framework for Next-Generation 911*; FCC 11-134, *Facilitating the Development of Text-to-911 and other Next-Generation 911 Applications*; FCC 12-149, *Next-Generation 911, Text-to-911, Next-Generation 911 Applications*]. These references discuss ongoing trials for developing and testing text-to-911 systems in a number of areas in the U.S., with the goal of nationwide deployment by 2014.

In 2011, the undersigned submitted a public comment to PS Docket No. 11-153; FCC 11-134 discussing the efficacy of text-to-911 systems and devices, and the ongoing development of text/data capable devices other than smart phones that can assist persons with disabilities to send text/data messages directly to a PSAP in

impending emergencies [See attached Appendix A]. Therein the undersigned discussed the importance of the development of text-to-911 capable devices to assist persons with disabilities [See A-4 to A-5; A-7], and other emergency text/data capable alarm devices that can assist persons with disabilities in home and fire and carbon monoxide ("CO") emergencies, known as *Wireless NG911 Location-Enabled Smoke and CO Alarms* [See A-6 to A-7]. These and other similar alarm devices are undergoing development, and the TTPTF should be familiar with the ongoing development and testing of such NG911 capable devices.

### **III. Development and Testing of NG911-Capable Alarm Devices**

#### **A. Federal Recognition of NG911-Capable Alarm Devices**

In a number of proceedings conducted by the U.S. Congress and federal agencies relating to the development of NG911, discussed was the development of "[N]on human-initiated automatic event alerts, such as alarms, telematics, or sensor data" that could send emergency text/data messages directly to a PSAP [See S.3115, *Next-Generation 9-1-1 Preservation Act of 2010*]. Also, the FCC discussed the need for "automatically triggered devices" and technologies that could communicate directly with a PSAP, including sensors, alarms, personal medical devices, and telematics [See, FCC 10-200].

#### **B. Development and Test Trials of Hazard Sensor Embedded Smart Phone Technology**

The U.S. Department of Homeland Security has a program developing hazard-sensor embedded smart phones for detection of a variety of environmental hazards. The program, called CELL-ALL has conducted a number of test trials, including a test in 2011 of smart phones interconnected to a CO sensor for automatically notifying authorities of the location of a CO emergency [See, Appendix B]. The CELL-ALL program estimated that such devices could be available as soon as early 2013, and widely available by 2015 [See, B-3].

#### **C. Development and Test Trials of Wireless 911 Location-Enabled Smoke and CO Alarms**

NG911 capable alarms devices, such as *Wireless NG911 Location-Enabled Smoke and CO Alarms* are currently under development that automatically transmit emergency text/data messages directly to a PSAP in the event of a fire or CO emergency [See, Appendix C]. Although such devices are designed to assist "at risk" populations (persons with disabilities, the elderly, and children), they are also designed for general residential applications.

Further, the National Fire Protection Association ("NFPA") is considering technical standards for such devices in NFPA 72, *National Fire Alarm and Signaling Code*, and NFPA 720, *Standard for*

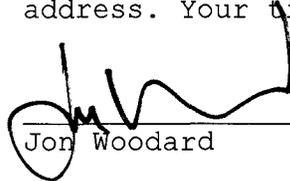
*the Installation of Carbon Monoxide Detection and Warning Equipment.*  
IN the A2015 revision cycle for NFPA 72, a technical committee is considering the inclusion of such a alarm device called a "Wireless 911-enabled Alarm Device," which is defined as:

A single-or multiple-station alarm device further comprising an integrated wireless telecommunications component connected to the control equipment within the alarm device, where upon receiving an alarm signal from the control equipment indicating a fire emergency, is configured to initiate a wireless 911 emergency call, transmitting a data or text message directly to a communications center.

[See, Appendix C-3 to C-4].

#### **IV. Conclusion**

The undersigned respectfully advises the TTPTF to consider the development and testing trials of the aforementioned NG911 device technologies that will assist persons with disabilities and the general public with having improved access to PSAPs and emergency services. Please feel free to contact Mr. Woodard at the above address. Your time and consideration is greatly appreciated.

  
\_\_\_\_\_  
Jon Woodard

6/30/2013  
Date

**Attachments: Appendix A through C**

APPENDIX  
A

**COMMENT TO:**  
**Facilitating the Deployment of Text-to-911 and Other Next-Generation 911 Applications; Framework for Next Generation 911 Deployment**

(PS Docket No. 11-153; FCC 11-134; 76 FR 63257)

December 1, 2011

Submitted by Jon Woodard<sup>1</sup>

I) Introduction

On October 12, 2011, the Federal Communications Commission (hereafter, "FCC") issued PS Docket No. 11-153, FCC 11-134; 76 FR 63257 entitled *Facilitating the Deployment of Text-to-911 and Other Next-Generation 911 Applications; Framework for Next Generation 911 Deployment*, (hereafter, "FCC 11-134") inviting public comment to technical, regulatory, and other issues relating to the deployment of text-to-911 and other applications for next-generation 9-1-1 (hereafter, "NG911"). Jon Woodard (hereafter, "Mr. Woodard") respectfully requests that the FCC consider these comments in favor of facilitating short-term text-to-911/NG911 technologies. Although this comment addresses a number of key issues and questions requested by the FCC, it does not address all of the issues in FCC 11-134. As such, the sections below will demonstrate:

- that interim text-to-911/NG911 solutions can benefit hearing and speech disabled persons and provide overall improved accessibility to the 911 system, since these persons are currently familiar with and prefer using wireless phones and text-messaging (e.g. SMS) [sections (B) and (D)];
- that receipt of emergency text messages will allow PSAPs to better communicate information about an emergency situation to first responders [sections (C) and (D)];
- that both short term and long term text-to-911/NG911 solutions will facilitate the deployment of NG911-enabled alarm devices for the benefit of hearing and speech disabled persons, emergency responders, and the general public [section (D)].

II) Comments to Specified Sections

A) The FCC Should Accelerate the Deployment of NG911 and Related Interim Technologies

Mr. Woodard supports the FCC's endeavor to accelerate the overall development and deployment of NG911 technology, and also supports the rapid deployment of related short-term or interim text-to-911 technologies. Mr. Woodard submits that although there are many technical methodologies for deploying NG911, ranging from current technologies that could be deployed now on an interim basis, such as variations of Short Message Service (hereafter, "SMS"), to Non-Voice Emergency Services ("NOVES"), that will be gradually available in the coming years, the FCC should allow wireless service providers, PSAPs, and

wireless device developers the option to deploy SMS for the benefit of consumers that are familiar with using SMS. The sections below will provide further comments on this topic.

As discussed in FCC 11-134, interim text-to-911 technologies including SMS have been successfully deployed in various field tests and trial simulations, with some SMS applications delivering ALI capabilities to PSAPs [FCC 11-134, ¶42 through ¶45]. With this in mind, FCC 11-134 discussed comments identifying general shortcomings of SMS for 911 reporting, submitted by AT&T, Verizon, and T-mobile, and the merits of SMS for 911 reporting, submitted by TCS, L.R. Kimball, and ATIS [FCC 11-134, ¶49 through ¶52]. Balancing these issues with SMS, the FCC found that “[it] is possible to overcome or mitigate some of the technical limitations of SMS at a reasonable cost to providers, PSAPs, and consumers,” and “[we] believe that PSAPs, providers, and vendors should have the option to implement SMS-to-911 as a short-term alternative.” [FCC-134, ¶54].

#### 1) NG911 Technologies Should be Deployed in Phases Similar to Wireless E911 Technologies

Also, the FCC and stakeholders should be mindful that short-term solutions would likely be measured in years, rather than in months. As the FCC and all stakeholders are well aware, wireless telecommunications technologies have gradually evolved over the last 20 years, and wireless emergency 911 technologies have followed accordingly. For example, the development and deployment of wireless E911 was a gradual endeavor, first beginning with Phase 1 wireless location technologies being first deployed on an interim basis over a number of years, following with the gradual deployment of the more precise Phase 2 wireless location technologies also taking longer to deploy.

Similarly, text-to-911/NG911 could be deployed gradually, with Phase 1 being SMS because of its current wide-spread availability, and Phase 2 being other more advanced NG911 technologies for allowing the transmission of text, data, photos, and video from wireless devices, that will be gradually developed, tested, and deployed over the coming years. The lesson here is that we did not wait for the full testing and development of Phase 2 wireless E911 location technologies before deploying Phase 1 wireless location technology. Moreover, we did (and still do) realize the benefits of countless lives saved and persons rescued due to the interim Phase 1 wireless location technologies. Therefore, we can have similar success with deploying short-term text-to-911 technologies such as SMS.

#### B) The FCC Should Accelerate the Deployment of Interim Text-to-911 for the Hearing and Speech Disabled

FCC 11-134 also discussed issues with the accessibility of 911, identifying the disparity between the technologies used for daily communication (smart phones, cell phones) that can directly access 9-1-1 services, and current technologies for persons with hearing and speech disabilities [FCC-134, ¶36]. These disparate technologies currently used by hearing and speech disabled persons for contacting 911 include

conventional land-line based TTD/TTY devices, which have been identified as cumbersome to use and at most marginally effective for 911 emergency reporting.

With this in mind, the FCC requested, “[to] what extent can such short-term solutions assist individuals with hearing or speech disabilities?” [FCC-134, ¶ 38]. Other related questions were posed, requesting the benefits and costs of facilitating short-term text-to-911 solutions that can improve accessibility of the 911 system, and, how receipt of emergency text messages allow PSAPs to better communicate information about an emergency situation to first responders on the ground. These questions will be addressed below primarily in the context of providing improved accessibility to 911 for hearing and speech disabled persons, and other “high risk” (children, elderly) persons.

#### 1) The 2011 FCC Report on the Survey of 911 Calling for Persons with Disabilities

The report published in July 2011 by the FCC’s Emergency Access Advisory Committee (hereafter, “EAAC”), entitled, *Report on Emergency Calling for Persons with Disabilities Survey Review and Analysis* (hereafter, “EAAC Survey Report”) provides valuable guidance into the importance of facilitating the short-term deployment of existing text-to-911 technologies during the transition to other wireless NG911 technologies with particular focus on persons with disabilities. The EAAC Survey Report provides insight into current consumer perceptions and the use of wireless phones, text-messaging, and direct communication with PSAPs using these technologies.

The survey, conducted by the FCC EAAC between March and April 2011, included survey respondents of which over 65% had some form of hearing disability [EAAC Survey Report, p. 6].

Regarding the types of telecommunications technology currently used by respondents, the report showed:

- over 62% of respondents use cell phones or smart phones almost every day;
- a combined 58.7% use SMS texting almost every day or fairly regularly;
- over 37% never use landline phones;
- between 73% and 99% of respondents never use the various types of TTY devices.

[EAAC Survey Report, pp. 13,15,16]. The report also showed respondents’ past use and future preferences for 911 emergency reporting, with key findings showing that:

- over 33% used 911 at least once in the past two years;
- about 20% used landline phones, about 17% used wireless/mobile telephones, and about 3% used other devices including cell phones for making the 911 calls;
- about 75% got through in calling 911, and about 37% encountered some form of problem;
- over 55% would prefer voice and text services for calling 911;

- over 70% would also prefer services that combine video, voice, and text services for calling 911;
- over 65% would prefer to contact 911 via text messaging or some other similar method;
- texting preferences for calling 911: Real-time Text, 45.7%; SMS, 45.1%; IM, 31.1%; TTY, 10.8%;
- device preferences for calling 911: Cell phone, 61.8%; Wireless Mobile Device (smartphone, pager, PDA), 53.7%; Landline phone, 52.1%;
- over 77% prefer direct contact with 911 rather than via a third party relay service;
- 70% of late deafened and 47% of deaf persons would prefer a feature that would automatically send a text-message to a 911 dispatcher in case of passing out or other interruption.
- between 86% and 98% of respondents in each disability group indicated it is very important or somewhat important being able to call 9-1-1 using the same device they use every day;
- over 59% have, or would buy a smart phone with a special 911 app;

[EAAC Survey Report, pp. 19-29; 42-44]. The combined findings of this report clearly show that a majority of respondents currently use some type of cellular or smart phone, and regularly utilize text messaging (e.g. SMS), and prefer to use this same technology for calling 911 in emergency incidents.

#### 2) Other Data Supports the Accelerated Deployment of Interim Text-to-911/NG911 Technologies

In a comprehensive survey by Mueller, Morris, and Jones (2009)<sup>2</sup> (hereafter, "Accessibility Survey") of wireless phone use by disabled persons from 2006 to 2008, results showed that, "88 percent of deaf respondents and 85 percent of hard-of-hearing respondents reported using wireless devices" (Accessibility Survey, p. 1). Further, the survey showed that among a list of preferred uses of wireless phones, respondents consistently ranked access to emergency 911 assistance among the top five (Accessibility Survey, p. 2).

The FCC should also consider that because landline phone service in U.S. households is steadily decreasing, (reducing the availability of TTD/TTY service) it is imperative that text-to-911/NG911 technologies be facilitated in the short-term so that wireless phones and devices can communicate directly with a PSAP via text-messaging. To illustrate, over the past several years many households have "cut-the-cord" choosing wireless phone service over landline phone service. In 2008, according to *Nielsen Mobile*<sup>3</sup> over 20 million U.S. households cut-the-cord to become wireless only.

Moreover, while the numbers of U.S. wireless subscribers continue to increase, the number of landlines continues to rapidly decrease. According to the *Economist*<sup>4</sup>, the number of U.S. households cutting the cord continued to grow in 2009 at a rate of 700,000 per month. Analysts estimate that 25%, or about 32 million of the 130 million households are now wireless only. Therefore, since the trend is growing towards

U.S. households using wireless phones as a primary home phone, and since the technology of these phones is steadily advancing, text-to-911/NG911 technology is vital for accessibility to PSAPs by all persons.

The FCC and stakeholders are well aware that TTY technology is being supplanted by smart phones and text-messaging for communication between hearing and speech disabled persons. With this in mind, the National Fire Protection association (hereafter, "NFPA") provides suggestions for the use of wireless phones by disabled persons in fire emergencies. In a recent booklet called *Fire In Your Home*<sup>5</sup>, the NFPA advises:

*Escape Tips... For Older Adults and People with Disabilities.* People who are deaf should learn right away what types of communication the 9-1-1 center or emergency service their community is equipped to accept. Some possibilities are TTY or phone text messages.

The NFPA booklet also indicates that emergency "text messaging" technology is currently available, but also advises deaf persons to "learn what types of communication the 9-1-1 center" is equipped with.

The FCC should also consider other examples showing the need of interim text-to-911/NG911 technologies, taken from an excerpt of an article in *NFPA Journal*<sup>6</sup> illustrating an example of how persons with speech disabilities are disadvantaged in reporting emergency incidents (e.g. fire/carbon monoxide) to a PSAP using voice-only cellular telephones without some form of text messaging:

Minnesota. A 54-year-old man suffering from lung disease and paraplegia was fatally injured in a townhouse fire started by his cigarette . . . The victim used his cell phone to call 911, but, due to his lung condition, he could not make the dispatcher understand his address.

As the above case shows, persons with speech disabilities are at a disadvantage when attempting to articulate that nature and location of an emergency to a PSAP dispatcher. The drawback of using landline telephones to report emergency incidents to 911 is illustrated in *NFPA Journal*<sup>7</sup> in another excerpt:

Connecticut. A 84-year-old man died of smoke inhalation in a fire caused by a faulty stove. After the man failed to extinguish the fire "He opened the front door, then walked up stairs to a bedroom to call the fire department on the home's only working telephone. This delay allowed the fire to spread up the stairwell and trap the man on the second floor.

These incidents may highlight another issue with wireless telephone technology, and the need to ensure that *all* wireless text-to-911/NG9-1-1 systems are upgraded with wireless location technologies mandated by the FCC, so that PSAP dispatchers can locate a caller (street address, longitude/latitude).

#### C) Interim Text-to-911/NG911 Will Facilitate Communication Between PSAPs and First Responders

Numerous examples can be cited showing how direct text-messaging to a PSAP via a cellular or smart phone will allow effective and efficient communication between PSAPs and emergency responders in the field. In general, when a PSAP receives timely and accurate information about the nature and location of

an emergency incident, then rapidly relays this information to emergency responders, fatalities, injury, and property damage are greatly mitigated. Examples of the potential effectiveness of wireless telecommunication and location technologies working together to facilitate communication between a PSAP and emergency responders involves using smart phone "Apps" and to receive detailed data about heart attack and other victims in need of assistance.

*Government Technology*<sup>8</sup> magazine reported that the San Ramon Valley Fire Protection District (California) developed a location-based smart phone app to provide those in need of CPR to get immediate assistance from persons in the vicinity with smart phones that have CPR training. In application, when a heart attack incident is reported to 911, the emergency dispatcher enters "cardiac assistance needed" into the computer-aided dispatch system, which notifies emergency responders and citizens with the smart phone app who are nearby the emergency, displaying an aerial photo/map with an icon pinpointing the location of the victim, and providing the address and other in text. Further, *Emergency Management*<sup>9</sup> magazine reported that the San Ramon Valley Fire Protection District also developed an iPhone "911 App" for emergency responders and citizens to receive and view on their iPhone live emergency dispatches from the county's PSAP.

D) Interim Text-to-911/NG911 Applications Should Support NG911-Enabled Alarm Devices for the Disabled

As shown above, recent data supports developing and deploying interim text-to-911/NG911 technologies that allow persons to directly communicate with a PSAP via text-messaging and cellular and/or smart phones. However, the FCC and stakeholders are also aware that NG911-enabled alarm devices will also benefit from the deployment of interim text-to-911/NG911 technologies. Specialized NG911-enabled alarm devices will be able to excel in specific emergency incidents where a caller in an emergency has a smart phone, but is unable to make an emergency call to a PSAP. A broad array of such NG911-enabled alarm technologies are available, ranging from automobile collision alarms to wireless smoke and carbon monoxide (hereafter, "CO") alarms for residential applications, the latter known as *wireless NG911 location-enabled smoke and CO alarms*.

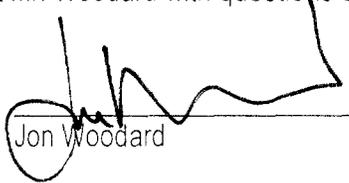
Based on the information and the incidents described in the sections above, hearing and speech disabled persons can directly benefit from wireless NG911 location-enabled smoke and CO alarm technology in the home. Wireless NG911 location-enabled smoke and carbon monoxide alarms overcome the shortcomings of conventional smoke and CO alarms for residential applications. They are self-contained, AC and battery operated alarm units interfaced with an integrated cellular/GPS and wireless network chipsets that operate in existing wireless communications systems. The chipset includes a memory for storing emergency identification data for automated wireless fire incident reporting to a PSAP. Upon sensing the

presence of smoke or CO, the alarm automatically transmits a 911 emergency text-message (e.g. SMS based) to a PSAP, alerting the dispatchers of the nature and location of the emergency. Other features include time delay/disable circuitry allowing a user to cancel unintentional or non-emergency 911 calls, and RF verification circuitry allowing a user to verify that the unit has a wireless signal.

Wireless NG911 location-enabled smoke and CO alarms and other NG911-enabled alarm devices will greatly benefit communication between PSAPs and emergency responders by allowing the rapid and concise relay of information of the nature and location of emergency incidents. Mr. Woodard is currently working with the NFPA to develop standards for wireless NG911 location-enabled smoke and CO alarm technology.

### III. Conclusion

Mr. Woodard appreciates the opportunity to comment on the issues presented in FCC 11-134, and requests favorable consideration of the foregoing. The FCC and other concerned parties are encouraged to contact Mr. Woodard with questions and comments at any time.

  
\_\_\_\_\_  
Jon Woodard

12-1-2011  
Date

### REFERENCES

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<sup>1</sup> Jon Woodard is a Fire Protection and Wireless Telecommunications Systems Consultant. He may be contacted by mail at: P.O. Box 5001, Seward AK 99664.

<sup>2</sup> Mueller, J., Morris, J., Jones, M. (2009). *Accessibility of Emergency Communication to Deaf Citizens* [Report]. Chantilly, VA. Retrieved from <http://www.wirelessrerc.org>

<sup>3</sup> Nielsen Mobile (2008). *Call My Cell: Wireless Substitution in the United States*. Retrieved from <http://www.nielsen.com/newswire>.

<sup>4</sup> Cutting the Cord: America Loses its Landlines. (2009, September 15). *The Economist*, 45.

<sup>5</sup> Fire In Your Home. (2010). National Fire Protection Association [Booklet]. Quincy, MA. [Author], pp. 32-33.

<sup>6</sup> Fire Watch. Smoking, home oxygen, contribute to fatal fire. (2010, September/October). *NFPA Journal*, 34.

<sup>7</sup> Fire Watch. Stove Ignites Fatal Fire. (2009, November/December). *NFPA Journal*, 17.

<sup>8</sup> Help is the way. (2011, May). *Government Technology*, 26.

<sup>9</sup> 911 App Informs Citizens. (2010, November). *Emergency Management*, 12. Retrieved from: <http://www.emergencymgmt.com/911app>.

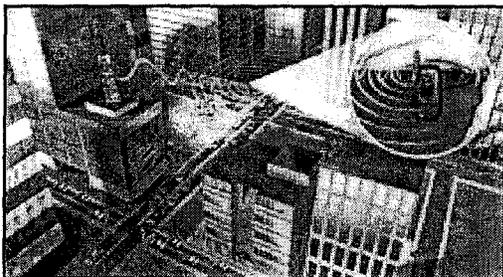
APPENDIX  
B

Don Woodard 4 pgs



# Homeland Security

## Cell-All: Super Smartphones Sniff Out Suspicious Substances



Anywhere a chemical threat breaks out—a mall, a bus, subway, or office—Cell-All will alert the authorities automatically. (Image by Paul Wedig)

### *Crowdsourcing cell phones to detect dangerous chemicals*

Years ago, if you wanted to take a picture, you needed a dedicated camera. You needed to buy batteries for it, keep it charged, learn its controls, and lug it around. Today, chances are your cell phone is called a “smartphone” and came with a three-to-five megapixel lens built-in—not to mention an MP3 player, GPS, or even a bar code scanner.

This Swiss Army knife trend represents the natural progression of technology—as chips become smaller and more advanced, cell phones continue to absorb new functions. Yet, in the future, these new functions may not only make our lives easier, they could also protect us—and maybe even save our lives.

The Cell-All initiative may be one such savior. Spearheaded by the Department of Homeland Security’s Science and Technology Directorate (S&T), Cell-All aims to equip your cell phone with a sensor capable of detecting deadly chemicals at minimal cost—to the manufacturer (a buck a sensor) and to your phone’s battery life. “Our goal is to create a lightweight, cost-effective, power-efficient solution,” says Stephen Dennis, Cell-All’s program manager.

How would this wizardry work? Just as antivirus software bides its time in the background and springs to life when it spies suspicious activity, so Cell-All regularly sniffs the surrounding air for certain volatile chemical compounds.

When a threat is sensed, a virtual *ah-choo!* ensues in one of two ways. For personal safety issues such as a chlorine gas leak, a warning is sounded; the user can choose a vibration, noise, text message, or phone call. For catastrophes such as a sarin gas attack, details—including time, location, and the compound—are phoned home to an emergency operations center.

While the first warning is beamed to individuals—a grandmother taking a siesta or a teenager hiking through the woods—the second warning works best with crowds. And that’s where the genius of Cell-All lies—in crowdsourcing human safety.

Currently, if a person suspects that something is amiss, he *might* dial 9-1-1, though behavioral science tells us that it’s easier to do nothing. If he does do something, it may be at a risk to his own life. And as is often the case when someone phones in an emergency, the caller may be frantic and difficult to understand, diminishing the quality of information that’s relayed to first responders. An even worse scenario: the person may not even be aware of the danger, like the South Carolina woman who last year drove into a colorless, odorless, and poisonous ammonia cloud.

In contrast, anywhere a chemical threat breaks out—a mall, a bus, subway, or office—Cell-All will alert the authorities automatically. Detection, identification, and notification all take place in less than 60 seconds. Because the data are delivered digitally, Cell-All reduces the chance of human error. And by activating alerts from many people at once, Cell-

All cleverly avoids the longstanding problem of false positives. The end result: emergency responders can get to the scene sooner and cover a larger area—essentially anywhere people are—casting a wider net than stationary sensors can.

But what about your privacy? Does this always-on surveillance mean that the government can track your precise whereabouts whenever it wants? To the contrary, Cell-All will operate only on an opt-in basis and will transmit data anonymously. “Privacy is as important as technology,” avers Dennis. “After all, for Cell-All to succeed, people must be comfortable enough to turn it on in the first place.”

For years, the idea of a handheld weapons of mass destruction detector has engaged engineers. In 2007, S&T called upon the private sector to develop concepts of operations. Today, thanks to increasingly successful prototype demonstrations, the Directorate is actively funding the next step in R&D—a proof of principle—to see if the concept is workable.

To this end, three teams from Qualcomm, the National Aeronautics and Space Administration (NASA), and Rhevision Technology are perfecting their specific area of expertise. Qualcomm engineers specialize in miniaturization and know how to shepherd a product to market. Scientists from the Center for Nanotechnology at NASA’s Ames Research Center have experience with chemical sensing on low-powered platforms, such as the International Space Station. And technologists from Rhevision have developed an artificial nose—a piece of porous silicon that changes colors in the presence of certain molecules, which can be read spectrographically.

Similarly, S&T is pursuing what’s known as cooperative research and development agreements with four cell phone manufacturers: Qualcomm, LG, Apple, and Samsung. These written agreements, which bring together a private company and a government agency for a specific project, often accelerate the commercialization of technology developed for government purposes. As a result, Dennis hopes to have 40 prototypes in about a year, the first of which will sniff out carbon monoxide and fire.

To be sure, Cell-All’s commercialization may take several years. Yet the goal seems imminently achievable: Just as Bill Gates once envisioned a computer on every desk in every home, so Stephen Dennis envisions a chemical sensor in every cell phone in every pocket, purse, or belt holster. If it’s not already the case, our smartphones may soon be smarter than we are.

## Contact

To request more information about this story, please e-mail [st.snapshots@hq.dhs.gov](mailto:st.snapshots@hq.dhs.gov).

This page was last reviewed / modified on March 10, 2010.



## Smartphones Take on Silent Killers as Portable Danger Detectors

By Allison Barrie

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9/28/2011

A silent killer threatens a family with a baby in a hotel room.

Fortunately, their smartphone wises up, senses the threat and notifies the authorities -- and the local fire department charges in to the rescue, saving the day.

This is no hypothetical scenario: As of this week, new technology can turn your cellphone into a portable "silent killer" detector. And in the near future, this technology has the potential to convert the average cellphone into a handheld detector capable of warning you of chemical warfare attacks and automatically calling for help.

On Wednesday, the Department of Homeland Security Science and Technology division demonstrated at the California Fire Department's training center exactly how this new technology, known as Cell-All, can save lives.

The threat of carbon monoxide, the silent, odorless, lethal gas known as the "silent killer," lurks in the average home and leads to at least 2,000 unintentional poisoning incidents per year. Experts believe the figure is far greater than this; poisoning can lead to flu-like symptoms and therefore go undiagnosed or unreported.

Appliances fueled with gas, oil, kerosene or wood, if defective or poorly operated, can produce the gas. Prolonged exposure can lead to unconsciousness and death. Several hundred Americans are killed by CO1 each year.

In a Cell All-enabled phone, a sensor picks up a threat and the user has three options to choose to deploy: set off an alarm to wake the phone's owner, send a text message to warn emergency contacts, and send out a "bat signal" (similar to a 911 call) to a commercial monitoring provider or local first-responder.

As of this week, Synkera Technologies has a Bluetooth version developed with DHS available to the public for trial and evaluation. An external sleeve that would go over the phone -- and was developed by NASA's Center for Nanotechnology with a major smartphone manufacturer -- may soon be available as well.

Direct integration into cell phones is about 18 months out, and expected to become widespread, just like the cameras that were once only available on certain models. DHS anticipates that Americans will want to protect themselves and their loved ones from the silent killer. The Cell-All sensor will become widely available after two phone cycles in three years' time, they predict.

Built for first responders, too

The Cell-All program has also developed a specific model, known as Chem-Tag, to address the toxic gas threats faced by American first responders -- carbon monoxide, methane and hydrogen cyanide. Working closely with FEMA's Domestic Preparedness Center, this technology was adapted to detect a range of harmful gases and comes in a sensor built to withstand both high degrees of heat and moisture that are typical of a burning building.

The first versions of Chem-Tag will be available for trial in the next six months. Currently, it's a self-contained unit, but they are looking at incorporating it into the clothing that a firefighter ordinarily wears.

Beyond tackling the silent killer and warning first responders of gas threats, the Cell-All initiative has developed over 100 other prototypes this year with a wide range of applications. For example, the team has a version that could be deployed in cellphones to protect employees working in industrial chemical environments by alerting them to an exposure threat.

DHS S&T has even looked at detecting the threats hidden in the humble nail salon down your street, developing a sensor to specifically target dibutyl phthalate, formaldehyde and toluene -- known as "the deadly trio" in the nail business.

Hand-held WMD detectors

Ultimately, Cell-All could be American's secret weapon against public threats at football stadiums or sarin gas-style attacks like the one that killed 13 people in Tokyo's subway system in 1995. Experts are always working hard to find ways to reduce the risk to Americans at large events that could be attractive targets to terrorists.

You might be entirely unaware of a chemical attack that Cell-All could detect automatically, whether in a stadium, subway or mall. Harnessing a vast network of cellphones equipped with this technology defeats false positives with multiple signal validation and widens the net well beyond what stationary sensors can currently provide.

"This innovative capability's time has come," DHS S&T program head Stephen Dennis said. And the power to detect, identify and notify authorities in under 60 seconds is a most welcome advance to protect Americans indeed.

*Ballet dancer turned defense specialist Allison Barrie has travelled around the world covering the military, terrorism, weapons advancements and life on the front line. You can reach her at [wargames@foxnews.com](mailto:wargames@foxnews.com) or follow her on Twitter @Allison\_Barrie*

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APPENDIX  
C

("CO") emergencies, where disabled persons, children, and the elderly are particularly vulnerable. In such incidents, NG911-enabled devices, such as wireless NG911 location-enabled smoke and CO alarms for residential applications would provide an effective solution over conventional smoke and CO alarms.

Further, in many cases conventional smoke alarms will be present and operational, but the occupants may still be unable to immediately evacuate the fire or to otherwise make an emergency call to a PSAP. Although many reasons exist for people not being able to properly react to a smoke alarm, vulnerable persons are especially at a high risk of injury or death in such incidents, and often rely on "passersby" with a cell phone, or neighbors to report the incident to 911. See Figure 2.

### Figure 2. Ineffective Conventional Smoke Alarms Result in Death

**Woman Killed by Oxygen Cylinder Damaged By Fire** (Florida) A 71-year-old woman died of blunt force trauma after she was struck in the head by an oxygen cylinder....A neighbor heard the smoke alarm operating....When he smelled smoke, he called 911 at 9:24 a.m.

**Candle Kills Man With Cognitive Disabilities** (Vermont) A man with obsessive compulsive disorder died from smoke inhalation in a fire that began when unsecured wall sconces holding lit candles fell onto his living room couch, igniting the upholstery, bedding, and sleeping bag. A passerby called the fire department at 10:35 a.m. and responding fire fighters heard smoke alarms sounding inside the house.

**Heating System Starts Fatal Fire** (Michigan) A fire that started in a forced air gas-fired heating system spread through ductwork to upper portions of a two-story, single-family house, killing an 86-year-old woman. A smoke alarm outside the woman's bedroom operated, but she used a walker and a wheelchair, and was unable to escape....A neighbor who heard the operating smoke alarm called 911 at 4:30 a.m.

**SOURCE:** Firewatch, *NFPA Journal*, March/April 2010

The Centers for Disease Control<sup>7</sup> reported that most victims of fires die from smoke or toxic gases and not from burns. In such fire scenarios, even fire sprinklers in a building or a home may not properly operate in low heat smoldering fires that produce a high volume of smoke before causing severe injury or death from smoke inhalation. In these and CO emergencies, automatic and rapid notification to a PSAP at the time of smoke or CO detection is imperative, so that emergency responders can be at the scene in the shortest possible time. See Figure 3.

**Wireless NG911 location-enabled smoke and carbon monoxide alarms** overcome the shortcomings of conventional smoke and CO alarms for residential applications. They are self-contained, AC and battery operated alarm units interfaced with an integrated cellular/GPS and wireless network chipsets that operate in existing wireless communications systems. The chipset includes a memory for storing emergency identification data for automated wireless fire incident reporting to a PSAP. Upon sensing the presence of smoke or CO, the alarm automatically transmits a 911 emergency text-message to a PSAP, alerting the dispatchers of the nature and location of the emergency. Other features include time delay/disable circuitry allowing a user to cancel unintentional or non-emergency 911 calls, and RF verification circuitry allowing a user to verify that the unit has a wireless signal.

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### Figure 3. Incidents of Fire Deaths Reported to 911 by Passersby or Neighbors

**Boy Killed in Manufactured Home Fire** (Alaska) A 9-year-old boy died and his 12-old brother was injured in a fire....Occupants reported that the home had two smoke alarms, but investigators could not locate any, and a survivor did not hear a smoke alarm during the fire...with one working phone, the residents were unable to call the fire department, and the fire was not reported for 20 minutes, when a passerby reported it by cell phone at 10:58 p.m. Firewatch. *NFPA Journal*. January/February 2010

**Two Dead in Space Heater Fire** (Ohio) A 70-year-old man and a 69-year-old woman died of smoke inhalation and burns in a fire....A deputy sheriff on patrol saw the fire and called in the alarm at 4:58 a.m. Firewatch, *NFPA Journal*. December/November 2010

**Child Dies in Wood Stove Fire** (Pennsylvania) A 2-year old boy died of smoke inhalation injuries he sustained in a fire that began in a wall near a recently installed wood-burning stove....A passerby saw the fire and called 911 at 7:30 p.m. Firewatch. *NFPA Journal*. January/February 2010

**Space Heater Starts Deadly Fire** (Louisiana) Three occupants of a manufactured home managed to escape from a fire in the dwelling, but two 6-year-olds, an 8-year-old, and a 10-year-old died in the blaze. A neighbor called 911, and the fire department responded at 12:05 a.m....They had died of smoke inhalation. Firewatch. *NFPA Journal*. March/April 2010

**Deadly Fire Blamed on Smoking** (Michigan) A 68-year-old man with advanced amyotrophic lateral sclerosis (Lou Gehrig's disease) died in a fire that began on the couch on which he was sitting, smoking....A passerby noticed the fire and called 911 at 3:45 p.m. Firewatch. *NFPA Journal*. March/April 2010

**Fatal Manufactured Home Fire** (North Carolina) A 27-year-old man, a 28-year-old woman, a 7-year-old boy, and a 2-year-old girl died in their manufactured home in a fire that began when a portable heater ignited a sofa bed....A neighbor called 911 at 3:13 a.m. after hearing glass breaking and the home's occupant yelling to those still inside. Due to a language barrier, however, the dispatcher initially sent only the police. Responding to a second 911 call at 3:16 a.m., firefighters arrived 11 minutes later to find the home engulfed in flames. Firewatch. *NFPA Journal*. May/June 2010

**Fatal Unattended Cooking Fire** (North Carolina) An 87-year-old woman died in a fire that started when a pan of grease left unattended on the stove ignited....A neighbor called the fire department at 3:11 p.m. Firewatch. *NFPA Journal*. January/February 2011.

**Manufactured Home Fire Kills One** (Louisiana) A 68-year-old man died in a fire that started in a bedroom off a center hallway of his manufactured home....A passerby called 911. Firewatch. *NFPA Journal*. January/February 2011.

**Wireless NG911 Location-Enabled Smoke and CO Alarms Mitigate These Incidents**

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72-21 Log #309 SIG-HOU

Final Action: Hold

(3.3.x Wireless 911-Enables Alarm Device (New) )

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**Submitter:** Jon Woodard, Seward, AK

**Comment on Proposal No:** N/A

**Recommendation:** Add new text to read as follows:

A single- or multiple-station alarm device further comprising an integrated wireless telecommunications component connected to the control equipment within the unit, where upon receiving an alarm signal from the control equipment indicating a fire emergency, is configured to initiate a wireless 911 emergency call, transmitting a data or text message directly to a communications center.

**Substantiation:** Next-generation wireless 911-enabled smoke alarm devices bridge the gap between single- or multiple-station smoke alarms and detectors in fire and carbon monoxide alarm systems. Household fire alarm systems typically comprise separate control equipment having wired or wireless connections to external detectors as part of a distributed system; in contrast, single- or multiple-station wireless 911-enabled alarm devices have within a single unit embedded wireless telecommunications components connected to control components and other alarm components including at least a detector, an alarm device, and a power supply. Other components within the unit include 911 call disable circuitry which includes a button on the housing of the alarm device for a user to manually cancel a 911 emergency call within a specified amount of time to prevent false alarms. Wireless signal indicator lights on the housing allow a user to verify wireless service to the alarm device.

Proposed TC and TCC action on comments

If the committee does not accept this comment, the undersigned requests that because the original proposal was returned as untimely, a "hold" under rule 4.4.6.2.2 is required for consideration in the next revision cycle.

On 11/16/2010, the undersigned originally submitted this as a similar proposal in print paper format, via U.S. mail, which as stamped received on 11/22/2010 by the codes and standards office, but returned as untimely due to a change in the proposal closing date of 11/23/2010, the date printed in the 2010 edition of the NFPA Journal Buyer's Guide. The undersigned did not have access to the internet and was not aware of the change in the proposal closing date.

**Committee Meeting Action:** Hold

**Committee Statement:** The technical committee agrees that this comment offers new material that has not had public review and is being held for processing as a proposal for the next revision cycle in accordance with 4.4.6.2.2 of the Regulations Governing Committee Projects.

**Number Eligible to Vote:** 27

**Ballot Results:** Affirmative: 25

**Ballot Not Returned:** 2 Cantrell, D., Long, Jr., R.

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72-416 Log #310 SIG-HOU  
(A.3.3.x (New) )

Final Action: Hold

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Submitter: Jon Woodard, Seward, AK

Comment on Proposal No: -

Recommendation: Add new text to read as follows:

Wireless E911 and Next-Generation 911 ("NG911") technologies allow communications centers (i.e. public safety answering points) to receive 911 emergency calls from standard wireless phones and smart phone to determine the geographic location and receive emergency text/date messages from such devices. The U.S. Congress and the Federal Communications Commission ("FCC") recognized the efficacy of NG911 technology for helping hearing impaired persons contact communications centers, and recognize the efficacy of NG911 technology for helping hearing impaired persons contact communications centers, and recognize the same for other wireless 911-enabled alarm devices.

The FCC announced its "Framework for Next-Generation 911 Deployment," (76 FR 2297; FCC 10-200; 2011, January 13) with the goal of revising regulation 47 C.F.R. §20, "to enable the public to obtain [911] emergency assistance by means of advanced communications technologies beyond traditional voice-centric devices." Therein is discussed NG911 systems and devices, including the application of telemetry for relaying sensor data to a communications center. The FCC identified specialized NG911 applications including device-initiated services for emergency communications, that envision a range of "automatically triggered devices" that could communicate directly with a communications center including sensors (above), alarms, personal medical devices and telematics.

**Substantiation:** NG911 is rapidly proliferating technology that is changing 911 emergency reporting in the U.S. Wireless 911-enabled smoke alarm devices have advantages in fire incidents, and overcome many existing shortcomings of conventional smoke alarms. In many cases, building occupants calling 911 reporting a fire emergency use either a conventional landline or cellular telephone. But often these telephones are located inside the dangerous area that the occupant is attempting to evacuate. The main drawback is that an occupant who is attempting to use a telephone, dialing 911, and waiting for a call connection, and verbally articulating the nature of the emergency and other detailed information to a communications center dispatcher can increase the chances of injury and waste critical evacuation and emergency response time. Moreover, vulnerable or high risk occupants may be substantially limited in hearing an alarm sound, or in their ability to quickly locate a telephone, dial 911, and effectively communicate with a communications center dispatcher during a life threatening fire emergency.

**Committee Meeting Action:** Hold

**Committee Statement:** See technical committee statement on Comment 72-21 (Log #309).

**Number Eligible to Vote:** 27

**Ballot Results:** Affirmative: 25

**Ballot Not Returned:** 2 Cantrell, D., Long, Jr., R.